## Calculus Warm Up #2-5

Same problem as yesterday...

| $t$ (seconds) | 0 | 8 | 20 | 25 | 32 | 40 |
|---|---|---|---|---|---|---|
| $v(t)$ (meters per second) | 3 | 5 | −10 | −8 | −4 | 7 |

The velocity of a particle moving along the $x$-axis is modeled by a differentiable function $v$, where the position $x$ is measured in meters, and time $t$ is measured in seconds. Selected values of $v(t)$ are given in the table above. The particle is at position $x = 7$ meters when $t = 0$ seconds.

part c & d today:

(c) For $0 \le t \le 40$, must the particle change direction in any of the subintervals indicated by the data in the table? If so, identify the subintervals and explain your reasoning. If not, explain why not.

(d) Suppose that the acceleration of the particle is positive for $0 < t < 8$ seconds. Explain why the position of the particle at $t = 8$ seconds must be greater than $x = 30$ meters.

Staple and turn in:

<u>Week 2 Classwork</u>

Warm up on top

Yellow FR Practice

Tan FR Practice

# HW Questions: p. 585

In Exercises 21–32, determine the convergence or divergence of the given series.

21. $\sum_{n=1}^{\infty} \frac{1}{2n-1}$

23. $\sum_{n=1}^{\infty} \frac{1}{n\sqrt[4]{n}}$

25. $\sum_{n=0}^{\infty} \left(\frac{2}{3}\right)^n$

$r = \frac{2}{3} < 1$ converges. $S = \frac{1}{1-\frac{2}{3}} = \boxed{3}$

27. $\sum_{n=0}^{\infty} (1.075)^n$

29. $\sum_{n=1}^{\infty} \left(1+\frac{1}{n}\right)^n$

31. $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^3}$

$\lim_{n\to\infty} \frac{\frac{1}{n}}{(\ln n)^3} = \frac{0}{\infty} = 0$ $n^{th}$ term test not conclusive

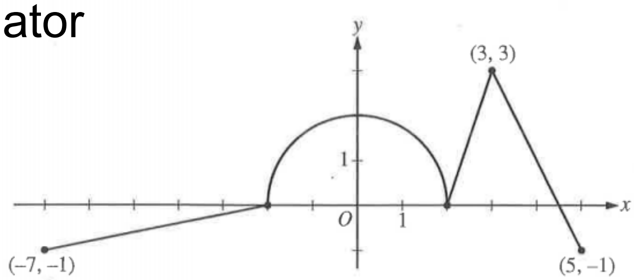
Integral Test

$\lim_{b\to\infty} \int_2^b \frac{1}{x(\ln x)^3}\,dx$ $u = \ln x$, $du = \frac{1}{x}\,dx$

$\lim_{b\to\infty} \left[-\frac{1}{2(\ln x)^2}\right]_2^b$

## Classwork: (Green) FR 2010 # 5 & 6

no calculator




Graph of $g'$

5. The function $g$ is defined and differentiable on the closed interval $[-7, 5]$ and satisfies $g(0) = 5$. The graph of $y = g'(x)$, the derivative of $g$, consists of a semicircle and three line segments, as shown in the figure above.

   (a) Find $g(3)$ and $g(-2)$.

   (b) Find the $x$-coordinate of each point of inflection of the graph of $y = g(x)$ on the interval $-7 < x < 5$. Explain your reasoning.

   (c) The function $h$ is defined by $h(x) = g(x) - \frac{1}{2}x^2$. Find the $x$-coordinate of each critical point of $h$, where $-7 < x < 5$, and classify each critical point as the location of a relative minimum, relative maximum, or neither a minimum nor a maximum. Explain your reasoning.

This classwork carries over to next week.

It will be turned in next Friday, April 13

## Classwork: (Green) FR 2010 no calculator

6. Solutions to the differential equation $\frac{dy}{dx} = xy^3$ also satisfy $\frac{d^2y}{dx^2} = y^3\left(1 + 3x^2y^2\right)$. Let $y = f(x)$ be a particular solution to the differential equation $\frac{dy}{dx} = xy^3$ with $f(1) = 2$.

   (a) Write an equation for the line tangent to the graph of $y = f(x)$ at $x = 1$.

   (b) Use the tangent line equation from part (a) to approximate $f(1.1)$. Given that $f(x) > 0$ for $1 < x < 1.1$, is the approximation for $f(1.1)$ greater than or less than $f(1.1)$? Explain your reasoning.

   (c) Find the particular solution $y = f(x)$ with initial condition $f(1) = 2$.

This classwork carries over to next week.

It will be turned in next Friday, April 13

HW: (white)

2010 FR # 1 - 3

Tuesday HW Quiz:
p. 579 & 585 only

Monday: MC Practice in class.

You will be given the 55 minutes

allowed for the no-calculator MC.

Checking answers and fixing it up will be homework.

Green 2010 #5 & 6 (No Calculator)

5a) $g(3) = \frac{13}{2} + \pi$

$g(-2) = 5 - \pi$

b) PI's @ $x = 0, 2, 3$